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67 Locust St.

Passed March 1828

an excellent Essay - & deserving of high Commendation - both in respect to the Pharmaceutic preparation of Opium - & also in that of its practical employment —

on

# Opium.

by

Edward Staples.

Opium is the inspissated juice procured from incisions made into the capsules of the Papaver Somniferum, a well known annual, belonging to the thirteenth class and first order, of the Linnean Botanical System.

The historical accounts of this very celebrated drug, are widely scattered through the early and recent history of the Materia Medica; and the statements of its medical virtues, and poison qualities, are various, and in some measure unsatisfactory; even its proximate principles so amply the subject of chemical research may still be the subjects of further experiments.

Very respectable authorities have erroneously thought, that its activity resided in a certain subtile part, somewhat analogous to essential oil, which on boiling Opium in water

they relate arises and may be condensed, which in doses of a few grains, has so much activity as to produce death in dogs unaffected by the common Opium in drachm doses. Newman has asserted that he knew a preparation of Opium, capable of producing stupefaction without its internal use, he fancied its action resembled the fumes of charcoal and like carbonic acid gas its baneful influence could be extended to a whole roomfull of persons. Our supplies ~~of~~ Opium are obtained from India and Turkey the latter is deservedly most esteemed. "Turkey Opium has a peculiar, strong, heavy, narcotic odour, and a bitter taste which is accompanied with a sense of acrid heat, or biting on the tongue and lips

which

if the opium be well chewed; and if it be long kept in the mouth of a person unaccustomed to chew it blistering is produced." (The peculiar odour, narcotic smell, and the adhesive qualities of Opium, are peculiarly affected by subjecting it to æther, in the process devised for making de narcotised Opium, the two first are nearly removed, and the latter essentially modified; and the powder when thrown upon a red hot coal gives off fumes more resembling animal substances burning and less the smell of tobacco stems under similar circumstances)

" The colour of Turkey Opium when good is of a reddish brown or fawn colour, its texture compact and uniform. Its specific gravity 1,336 which

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when compared with the condensed jui
ces of of other plants, is heavy being only
excended in this respect by Gum
Arabic and Opopanax". When dry
its fracture is uniform, yielding a
powder of a yellowish brown, which
the temperature of the hand is suffi
cient to render adhesive". It is in
flammable, and the powder when
thrown upon a red hot coal gives
slightly the smell of burning tobac
co stems - Its best solvent is di
luted alcohol combined with acetic
acid, Alcohol of 40 Beaumé (about 81°) dissolves
but small portions even at a boiling
heat, and Aether of 60 of the same
scale, dissolves a much smaller
portion than pure Alcohol. Water
distilled from Opium in powder,
has faintly the smell of the drug.

alcohol of 40 distilled under the same circumstances, is unchanged and without odour, when however, ammonia is combined with the water, or alcohol, the odour is peculiar, and perceptible in both, the watery, and spirituous distillations. In 1803 M Derosne described a salt obtained from opium, which has since been supposed to be the meconate of Morphia, more recently asserted by M Robiquet to be Narcotine. M Seguin in 1804, discovered a crystalline body in Opium, and described most of its properties without having been aware of its alkaline qualities.

M Sertuerner first announced in 1817 Morphia as an alkaline substance, his precipitates

obtained by ammonia, were seven at times dissolved in diluted sulphuric acid, and as often precipitated by ammonia, in order to remove the colouring matter, which was not finally effected, without the aid of Alcohol, and the salts at last described as a coloured substance. From the researches of these gentlemen, and those of M Robiquet it is asserted that Opium is composed of "1st, a fixed oil; 2nd of matter analogous to caout chouc; 3d, of a vegeto animal substance; 4thly, of mucilage; 5thly, of feculent matter; 6thly, of resin; 7thly, of the remains of vegetable fibre; 8thly of narcotine; 9thly of meconic acid; 10thly, of an acid discovered by M Robiquet; and 11thly of Morphine"

The several ingredients composing Opium are supposed to be inert with the exception of Narcotine and Morphine. The meconic acid is only interesting in consequence of its connection with Morphine existing in opium as the solvent of that substance. Narcotine may readily be obtained from Opium, by the repeated use of Æther, which dissolves besides that substance a portion of the matter analagous to caoutchouc, by removing the æther by distillation, acting upon the mass left in the retort with strong alcohol, suffering crystals to form, washing them with oil of turpentine, and re ~~dissolving them~~ in strong alcohol, pure narcotine may be of obtained in crystals, of nearly a snow white.

The quantity of caoutchouc, in opium, is inconsiderable, when compared with many vegetable substances. Seven ten hundred and sixty one grains, were subjected to eight times the bulk of Oil of turpentine, for several days, at a temperature above seventy, only sixty four grains were dissolved. The Narcotine, when produced from the same Opium was destitute of the substance resembling caoutchouc always produced when æther is the first solvent. Of the most important substance obtained from Opium Morphia. Having tried with unsatisfactory results the processes detailed by Magendie and others I have endeavoured to frame a formula founded upon experiments made upon a small scale

in which I succeeded in procuring the article in a crystalline form by the first precipitation - The results of these experiments induced me to combine acetic acid of greater strength (having used common vinegar at first) with the alcoholic menstruum also used, and employ another chemical agent heat, the results when cautiously pursued quite equalled my expectations. The formula which I think will be found best adapted to the various ingredients in Opium, holding them in well balanced solution, and which may be modified to answer the peculiar indication which dissimilar lots of Opium may present, is the following.

Four ounces of coarsely powdered Opium are to be subjected to the action

of three ounces of strong acetic, acid
and an equal quantity of pure water,
for twenty four hours in a temperature
over 70 Farenheits, after which eight
ounces of Alcohol of 35 Beaume (spe
cific gravity about ,835) are to be ad
ded, and a further digestion suffer'd
of six or eight hours, in a similar
temperature, the heat of the solution
then to be gradually raised by means
of a water bath to 160 Farenh.t, and
after having remain'd at that heat
for a short time to be thrown upon
a flannel strainer, (here the appa
ratus contrived by professor Hare for
facilitating filtration by heat as well
as in other stages of the process may
be used with great advantage) the
undissolved portion of Opium, is then
to be subjected to a similar portion

of acetic acid and water as before, adding Alcohol, suffering digestion, and raising the temperature, as before, and the second solution having been thrown upon the flannel strainer, should be well prest'd while hot from the dregs of the Opium. The two highly colouri'd acidulous tinctures, may be mixed and all the transparent portion be decanted, subjecting to filtration, only the small portion which always subsides after straining. All the transparent liquor by the two exhaustions should now be placed in a suitable glass vessel for precipitation, which is to be effected by Ammonia in Alcohol, added with so much caution that no apparent disturbance takes place, this may best be done, through the medium of a glass tube

extending to the bottom of the vessel, the specific gravity of the ammoniated Alcohol ensuring its more uniform diffusion throughout the menstruum, when introduced at the bottom, the proper strength of the precipitant is also more readily assertained, if turbidness is apparent at the end of the tube the alkali is not sufficiently diluted

The ammonia is to be added from time to time until the acetic acid is saturated, this to be determined by the appropriate test or even the smell relied upon as a sufficiently accurate indication; after saturation, the solution should be placed in a cool situation, exposed to the light, the crystals will soon begin to form, and in the course of a

few days, nearly all the Morphia will have receded from the solution, especially if the weather is favourable.

The crystals which consist principally of Morphia, should be collected and washed, in a small portion of warm water, or cold diluted alcohol, in either case, returning the slightly coloured washing, to the solution from which the crystals were obtained, after which they may be set aside to await the result of evaporating the extract, or may be immediately subjected to the action of boiling alcohol of 35 from it when cold the Morphia will subside in crystals of silky white. The solution containing the colouring matter and other substances found in opium now deprived of nearly all its

Morphia, may be submitted to distillation in a water bath, permitting the liquid to cool when reduced one third, in order that more crystals may form should Morphia still remain in solution, and it may be well to suffer the liquid to cool at another point of distillation, for the same purpose, it will however, be found that nearly all the morphia recedes from the first solution in the first precipitation

The residue of the solution, may be evaporated in a water bath, and the extract of Opium deprived of Morphia be form'd. The following appears to be the rationale of the process. Opium is presented in solution, in its best solvent diluted alcohol, the power of which,

is much exalted by heat and acetic acid, (from which pure aqua ammoniae, would produce the precipitation of several of the ingredients of opium in a very imperfect manner) combined with alcohol the most soluble portions are still retain'd in the solution by its aid while the uncombined Morphia, but little soluble in pure alcohol and less so when colouring matter is present, recedes gradually from the solution

Experimental illustration. Four ounces of coarsely powdered Opium was twice acted upon by the heated menstruum in the manner detail'd on the first trial 868 grains were dissolved, on the second 350 grains from each separately Morphia was obtain'd, the result 80 grains of pure

Morphia and 10 grains of impure,
An extract was then formed con
taining all the ingredients of Opium,
except Morphia, of the consistence
and colour of pitch. A young
gentleman repeated the experiment,
and obtained from a similar por
tion of Opium, one drachm and
fifty nine grains, he submitted
the Opium to longer digestion, and
was aided by cool weather while
my experiment was made in the
warmest season. I
think there is reason to believe, that
the process can be further modified,
by using the powerful agents heat
and acid, and the cautious addi
tions of Alkali, that by merely redu
cing the solvent power of the menstru
-um, without even saturating the

acid, the Morphia will recede, acetic acid seeming to dissolve the colouring matter, in preference to saturating Morphia. From a very strong acetic tincture crystals have formed after cooling. The formula however as detailed, is uniform in its productions, and easy to be reduced to practice; it seems to me particularly suitable to Physicians situated at a distance from large Cities, who occasionally may meet with persons, who from idiosyncrasy cannot with advantage take any of the usual preparations of Opium, following its details the Morphia may be produced in a very short time, even from a drachm of Opium, (the professor of chemistry in the University

has produced the morphia from the common tinctura Opii); from the acetic tincture made with the purified vinegar of the Pharmacopia, and Alcohol it may at any time be made with, certainty and facility, although not with same result, as to quantity, as when all the directions of the formula are observed. The utility of the formula, as a test of the quality of Opium, will under its simple details interesting to the Pharmaceutist: its application to the examination of the reputed Persian Opium should that factitious article, again either simply, or in combination get before the publick, is peculiar by appropriate. With regard to its chemical characters, it may

be objected, that the expense of using Alcohol as a solvent, in the first place, will preclude its general adoption; this I think will be found incorrect when it is considered that every process known renders alcohol necessary to remove the colouring matter from the precipitate, and this is accomplished with so much difficulty that professor Thompson recommends, the use of charcoal for the purpose, the Morphia will inevitably be entangled in this substance and require boiling alcohol again and again to remove it. If all the various washings, and solutions in alcohol, which succeed the pre the precipitation, by the usual

methods, are considered the balance will scarcely preponderate against its use in the first instance. The quantity of ammonia, will be less than is usually required, and the portion beyond saturation will be reclaimed in the alcohol distilled from the extract. In the formula of M Robiquet, it is recommended to make an aqueous extract, after the magnesian process, in asserting that some of the Morphia is still retained in solution, if the Opium is diffused through sufficient water to hold all the Morphia in solution this must be a tedious and expensive process, and attended with some risque of impairing the supposed vir

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ties of the extract. The extract which is the sequel of the process here in detailed, will be far more condensed in the first place and being in an alcoholic menstruum, will require the expenditure of much less heat than will be required, to drive off a similar quantity of water.

The acetic acid seems preferable on account of its acknowledged solvent power of vegetable substances, it will form in the extract, in combination with ammonia, the Spiritus Mindereri, a mild and salutary substance.

Descanting on the use of Opium a distinguished professor observes "of all the articles of the materia medica, this is the most extensively useful, there being

scarcely one morbid affection, or disordered condition, in which, under certain circumstances, it is not exhibited, either alone, or in combination." "Concerning the operation of Opium, medical sentiment continues to be divided, though the preponderance is decidedly in favour of its stimulant properties and with such an impression it is employed." "Exhibited internally, in an adequate dose, Opium produces the following changes in the vital functions. The pulsations of the heart and arteries are first rendered quicker, fuller, and stronger, and afterwards slower than at the time of taking it. With the increase of frequency in the pulse, the heat of the body is generally somewhat augmented. The respiration is little

affected, except a large dose has been taken, towards the conclusion of the operation of which, it becomes slow, stertorous and laborious." The natural functions are thus disturbed. "The appetite and digestion from unusually large, or frequently repeated doses are generally impaired, and vomiting often induced; the discharges from the intestines are diminished or suppressed, secretion and excretion are impaired in every part of the body except the skin, the discharge from which is evidently augmented, sometimes preceded or attended with a sense of pricking or itching of the skin terminating now and then in a species of miliary eruption"

The animal functions are affected as follows "The hilarity of the mind is by degrees augmented, and continues to

increase if the dose be considerable, until the delirium of intoxication is produced, which, as when resulting from spirituous liquors is attended in different constitutions with different symptoms. It is, however, more generally productive of a pleasant and joyous state of the mind than the contrary and, in many it increases the venereal propensity. These effects continuing for some time are succeeded by others of a very opposite character - the mind becomes gradually dull, and languid there is aversion to motion, obtuseness as to impressions, and inclination to sleep - The Turks resort to its use to inspire courage, to soothe sorrow, or dissipate misfortune, to allay the demands of hunger during their fasts, and to supply the place

of stimulating liquors common in Countries where a different religion prevails.

Opium may be used with great advantage in Intermittents, if administered about an hour before the paroxysm, and even according according to Lind, in the hot stage, this practice may be injurious when the system is plethoric, and inflammatory, but highly beneficial, under opposite circumstances. Its use in Continued fever and in pneumonia, should be preceded by suitable depletory measures; in the former it is sometimes useful in the advanced stages as a stimulant, in small doses at regular intervals, and in larger portions, when one object is to allay irritation; in the latter after general and local bleeding, and blistering,

when the cough is productive of pain and sleeplessness, opium may be employed with safety and advantage.

Sanson used opium in mortification of the lower extremities, with manifest advantage, as soon as pain ceased and sleep was procured, the line of separation became evident. Doctor Harrison found great advantage, from the use of one drachm of opium dissolved in an ounce of Nitric acid, twenty to forty drops produced salutary effects, in consumption, when the usual preparations were unavailing, and the Nitric acid alone was also without effect. In tetanus the use of opium, is our chief reliance, the amount demanded in this disease, as well as in Mania potu

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is often very large, in the latter disease it should be urged until sleep is the result a necessary incident to cure. Since what has been urged, as to the use of Opium, in certain stages of almost all diseases, it seemed only necessary to name a few, to which I have just referred, in which its use was peculiarly appropriate. It remains for me, to speak of the use of that peculiar proximate principle denominated Morphia, this substance and its usual saline preparations may be used in probably all cases as a substitute for Opium, with all the advantage derived from the use of that article; and its use is especially appropriate, in all cases, where from idiosyncrasy, the common preparations of Opium, cannot

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be safely employed. the preparations of Morphia seem also to produce very salutary effects in surgical disease and in mania potu in both diseases to transcend the power of common Opium the illustration of this remark as well the use of Morphia in a few other cases will be gathered from the subjoined remarks principally made by Medical friends to whom the Article has been supplied. One gentleman has politely furnished me with notes of three cases "1st a frenchman labouring under intermittent fever. He had long accustomed himself to the free use of strong drink, and owing to the depleting course which his disease demanded, he was strongly threatened with delirium tremens. The fullness and activity of his pulse, and the unpleasant in

fluence of Opium on his constitution rendered it obviously improper; and the restlessness and total inability to sleep which had tormented him for forty eight hours rendered repose by some means indispensable. Under these circumstances I gave him one fourth of a grain of Morphium every hour, until he took three fourths of a grain. he then became composed and enjoyed a comfortable nights sleep all his symptoms became ameliorated, and I had no occasion to repeat the dose". "The second case was an English gentleman whose constitution was greatly impaired by too great indulgence both in drinks and meats, He had been ill of fever of a slow remittent type for two weeks before my seeing him; and had indulged, more or less, during that whole period, in an occasional glass

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of wine, and sometimes stimulating foods, from an unconquerable apprehension of falling into typhus, He had slept very little for several nights, and the symptoms of mania potu, were, for several of the first days of my attendance, very threatening. I gave him at 8 O'clock in the evening one fourth of a grain of Morphium and repeated it at 10 O'clock He rested much better that night than he had for a number of nights previously. I gave him on the three subsequent evenings one fourth of a grain at bed time, always with good effect". "My third patient was an Irishman, long used to strong drink and hard work, He also laboured under fever of an intermittent type. As he was unable to sleep without anodynes of some sort, I gave him half a grain of Morphium, which, not having

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produced sleep in two hours after, was repeated. He slept well, and had no necessity for its employment afterwards."

Another medical friend informs me that he has derived more advantage from the use of morphia in sciatica than could be expected from Opium under the same circumstances. A medical student whose case required some anodyne every night, informed me that he had derived the same advantage from the use of Lemon juice, saturated with morphia, in the small dose of three or four drops, than he formerly did from thirty drops of laudanum without the disagreeable sensations experienced after taking the latter. A gentleman labouring under Necrosis with extensive ulcerations so painful as to require frequent use of anodynes has for over

six months derived great advantage from the use of Morphia having used over two hundred grains the dose with which he commenced is now used and its good effects uniformly experienced. the bowels in consequence of its use have not required medicine, the other preparations of Opium affected his head and rendered him otherwise very uncomfortable - A gentleman habituated to the free use of stimulating food and drink several times in a state threatening mania potu, for which complaint he had been treated before I saw him, was treated with Morphia, urged until composure resulted, in every instance with speedy and complete success - Professor Gibson used Morphia in two important surgical cases this winter and I believe he was

well pleased with its effects –

Morphia in combination with Ipecac wanhar in imitation of Dovers powder has only once been used within my knowledge its effects were very salutary in this combination I think much advantage may be anticipated.

In conclusion it remains for me only to suggest that experiments are much wanting to determine the minimum dose of Morphia which will represent the usual dose of Tinctura Opii, small portions of Morphia so far as I can learn will often answer the purpose of a dose of Laudanum, I mean portions even smaller than the fourth or even the eighth of a grain. It seems to me also a subject of the greatest importance to determine the relation which Narcotine bears to Morphia

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I shall not be surprised to learn that its character widely differs from the description drawn by M Magendie being perhaps a comparatively harmless associate with Morphia resembling in some degree the relations of Cinchonine and Brucine with their associates. This view if correct will not destroy the utility of the De Narcotised Opium this preparation is well known and highly commended Aether besides Narcotine removes a variety of substances from Opium more soluble in it than even that substance perhaps to their removal may be attributed its acknowledged superiority over the common Opium.